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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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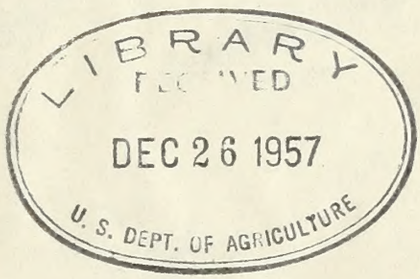

The Insect Control Situation in Oregon and Washington.

October 21, 1929.

A. J. Jaenicke,
U. S. Forest Service,
Portland, Oregon.

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This report has been prepared in response to Mr. Brundage's memorandum (FC, Finance) of October 10. In this memorandum the need was expressed for data on the insect control situation in District Six which could be used by Mr. Kelley in the Congressional Committee hearings in his efforts to have the insect control work and insect research placed on an adequate financial basis.

In August, 1929, when the Agricultural Sub-Committee of the House Committee on Appropriations visited District Six, the insect situation was discussed with the Committee by F. P. Keen of the Bureau of Entomology, A. J. Jaenicke of the Forest Service, and J. F. Kimball of the Klamath Forest Protective Association of southern Oregon. Inasmuch as the beetle problems of southern Oregon were particularly pressing, the Committee requested a report from the Klamath Forest Protective Association. This statement was forwarded by Mr. Kimball on October 14 to Major Stuart for transmittal to the Committee. Because it summarizes the situation in southern Oregon in brief form, the statement is included in full in the last section of this report. Mr. Keen and I are in full accord with the facts set forth in Mr. Kimball's description of the problem in southern Oregon.

The Congressional Committee was furnished in August, 1929, with two blue prints showing in graphic form the beetle losses, the control expenditures and the needed control appropriations for Oregon and Washington. These blue prints are also incorporated in this report.

The Major Problems

In Oregon and Washington, the major insect control problem is undoubtedly centered in the mature western yellow pine stands of eastern Washington and of southern and eastern Oregon. Dendroctonus brevicomis is responsible for over 90 per cent of the insect losses in these pine stands. At present, nearly all of the control work in Oregon and Washington is directed against these brevicomis infestations.

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Tremendous bodies of lodgepole have been killed in widely distributed portions of eastern Oregon and eastern

Washington during the past ten years by Dendroctonus monticolae. These bug-killed areas cover many thousands of acres and constitute fire hazards of the worst sort. The destructive fires on the Chelan National Forest during 1929 were made much more difficult to handle because of bug-killed lodgepole. These lodgepole epidemics are still in progress. Except for a small amount of recent work in the Diamond Lake area on the Umpqua National Forest and the Sand Creek area on the Crater National Forest in southern Oregon, two areas of high recreation value, no attempt has been made in Oregon and Washington since 1914 to place lodgepole epidemics under control. This is the case because of the relatively low timber value of lodgepole in this District and because of certain inherent difficulties in successfully placing lodgepole epidemics under control, such as rapid spread of the infestations and their simultaneous appearance over large areas. Lodgepole forests have unquestioned watershed values on the east slope of the Cascade Mountains in Oregon and Washington, but present control methods are too expensive and uncertain to justify their use in stands primarily valuable for watershed protection. In some quarters, there has been a growing feeling that lodgepole infestations should be attacked in their incipiency to prevent the development of high fire hazards. The fact that the bug-killed lodgepole stands are frequently immediately adjacent to or intermingled with fairly valuable yellow pine timber, gives this argument some weight. During the period 1910-1914 inclusive, $42,000 was spent on the Ochoco and Whitman National Forests in northeastern Oregon in monticolae infestations, primarily in lodgepole, because it was believed at that time that these lodgepole infestations were a real beetle menace to nearby yellow pine. Later experience, at least in Oregon, has shown that the monticolae beetles emerging from the lodgepole do not kill enough western yellow pine to justify the treatment of nearby infested lodgepole timber.

Monticolae attacks in sugar pine and western white pine are prevalent but neither of these species are sufficiently important in this District to be considered more than an incidental part in the insect protection program.

Thus far, the extensive Douglas fir forests and the associated species in western Oregon and western Washington have been reasonably free from beetle attacks. However, at indeterminate intervals, Douglas fir and hemlock suffer severely from caterpillar outbreaks. During the three-year period 1920-1922, over one-half billion board feet of western hemlock and Douglas fir was killed in Tillamook County, Oregon, by an epidemic of the western hemlock looper (Ellopia fervidaria).

PINE BEETLE SITUATION
IN
WESTERN YELLOW PINE
ON THE
NATIONAL FORESTS OF OREGON

*Annual Pine Beetle Damage**

Pine killed — 180,000 M Board feet
Value — — $630,000
Equivalent to complete destruction of 18,000 acres yellow pine every year

Annual Beetle Control Program

Explanatory Note.

Annual appropriation $50,000 will cut beetle loss one-half. Remainder of loss largely unavoidable with present control methods and timber values. Inadequacy of Forest Service apropriations often seriously jeopardizes success of control work on intermingled private timber. About $25,000 needed to combat preventable loss of nearly fifty million feet annually on other federal yellow pine in Oregon. Expansion of research by Bureau of Entomology needed for improvement existing control methods.

Private Land Loss - On the privately owned yellow pine land in Oregon the annual beetle loss amounts to 150,000 M bd. ft. valued at $600,000.

*Average annual loss for National Forests of Oregon during period 1924-1928

PINE BEETLE SITUATION
IN
WESTERN YELLOW PINE
ON THE
NATIONAL FORESTS OF WASHINGTON

*Annual Pine Beetle Damage**
Pine killed - 29,000 M board feet
Value $80,000

Annual Beetle Control Program

Annual appropriation of $10,000 will cut beetle loss one-half. Remainder of loss unavoidable with present control methods and timber values.

Private Land Losses - On the privately owned yellow pine land in Washington, the annual beetle loss amounts to 20,000 M. bd.ft. valued at $60,000

**Average annual loss for National Forests of Washington during period 1924 - 1928*

In 1890 a previous outbreak of this same insect killed billions of board feet of Douglas fir, western hemlock and Sitka spruce in northwestern Oregon and southwestern Washington. Within ten years, fires swept over these bug-killed areas and spread into large forests of green timber. It is exactly this same fire problem which is now giving the Tillamook Forest Fire Association concern in the localities visited by the 1922 looper invasion. The timber killed by the looper constitutes a fire hazard of the worst sort. It is possible that subsequent caterpillar invasions of this sort can be placed under control by airplane dusting. The Provincial Forest Service of British Columbia used this method against an incipient western hemlock looper outbreak this summer. Elsewhere in this country and Canada the airplane has been used with varying success against this caterpillar and other forest caterpillars of similar character. These epidemics occur with such startling suddenness that money must be immediately available to take advantage of the short time during which control work may be feasible and effective. The delay of even a single year will usually put such an epidemic beyond the possibility of control. In July of this year, the black-headed spruce budworm (Peronia variana) was discovered to be very active in national forest and privately owned western hemlock in the Olympic Peninsula. Fortunately, this caterpillar outbreak promises to come to an early end due to the prevalence of parasites. However, this outbreak is mentioned to emphasize the importance of financial preparedness to cope with such emergencies should control measures seem feasible.

Statistical Data on Yellow Pine Beetle Losses

Oregon

1. Annual loss by pine beetles in yellow pine on national forests of Oregon:-

   Pine killed - 180,000 M. board feet.
   Value pine killed - $630,000.
   Equivalent to complete destruction of 18,000 acres of yellow pine every year.

2. Control measures:

   Average annual expenditure during 1924-1928 inclusive - $8,000.
   Average annual amount needed - $50,000.

Washington

1. Annual loss by pine beetles in yellow pine on national forests of Washington:-

Pine killed - 29,000 M. board feet.
Value pine killed - $80,000.

2. Control measures:-

Average annual expenditure during past five years - $1,000.
Average annual amount needed - $10,000.

It is estimated that in Oregon, the annual pine beetle loss in privately owned yellow pine amounts to 150,000 M. board feet, worth at least $600,000. Added to this is an estimated annual pine beetle loss of 50,000 M. board feet on federal lands other than national forests, such as Indian lands, O and C lands, and unreserved public domain.

In Washington, the beetle losses in privately owned yellow pine are equal annually to at least 20,000 M. board feet, worth $60,000.

The Oregon Situation

As has already been brought out, the control of brevicomis infestations in western yellow pine timber is the outstanding insect problem in Oregon, both from the standpoint of the private owners and the Forest Service. The most destructive brevicomis epidemics in the State are now in progress in Klamath and Lake Counties of southern Oregon. These epidemics are described in the statement of the Klamath Forest Protective Association previously referred to and embodied in the last section of this report. Parts of the Crater, Deschutes and Fremont National Forests in Oregon and the Modoc National Forest in California are involved. In addition, O and C lands and unreserved public domain are included in the epidemic areas. A considerable part of the Klamath Indian Reservation is seriously infested also, but the Indian Service officials have $25,000 available during the present fiscal year and had $25,000 the previous fiscal year to handle the beetle epidemic on the Indian lands. The continuation of the present annual appropriation for several years will enable the Indian Service to get the present destructive epidemic under control.

Washington

1. Annual loss by pine beetles in yellow pine on national forests of Washington:-

Pine killed - 29,000 M. board feet.
Value pine killed - $80,000.

2. Control measures:-

Average annual expenditure during past five years - $1,000.
Average annual amount needed - [illegible],000.

It is estimated that in Oregon, the annual pine beetle loss in privately owned yellow pine amounts to 130,000 M. board feet, worth at least $600,000. Added to this is an estimated annual pine beetle loss of 50,000 M. board feet on federal lands other than national forests, such as Indian lands, O and C lands, and unreserved public domain.

In Washington, the beetle losses in privately owned yellow pine are equal annually to at least 30,000 M. board feet, worth $60,000.

The Oregon Situation

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In addition to southern Oregon, beetle epidemics are now in progress, or have recently been in progress and are likely to occur again, on the Whitman and Mount Hood National Forests, as well as considerable yellow pine areas on the Crater, Deschutes and Fremont National Forests. The location of these going and recent epidemics is shown on a map accompanying this report. In the majority of cases, both private and national forest timber are included in these epidemics. Generally speaking, the larger timber owners are alert to the need of pine beetle protection work. The occasional inability of the Forest Service to meet the cooperative attitude of such timber owners is a matter which the timber owners view with growing impatience.

During the three-year period 1922-1924, an appropriation of $150,000 was available to carry the federal share of control work in southern Oregon on Indian lands, O and C lands, unreserved public domain and national forest timber. This appropriation fully met the needs of the situation from every standpoint. However, the virulent and widespread character of the beetle epidemics was such that the failure to follow up the three-year program by similar work nullified, in part, the results of the timber owners and the Federal Government. The privately owned timber is so closely intermingled with the national forest timber and timber in other forms of federal ownership, that neither the government nor the timber owners can successfully carry on the large-scale control operations which are necessary to secure results in dealing with brevicomis epidemics. The piecemeal fashion in which both the timber owners and the Forest Service have handled the southern Oregon problem since 1925 is the direct result of the inability of the Forest Service to meet promptly and adequately the financial emergencies which have arisen. The organized efforts of a large body of timber owners during the 1922-1924 period have been replaced by spasmodic work on the part of a few large timber owners, largely because of the uncertainty of federal cooperation and the lack of assurance that after the initial control work on an epidemic has been completed, that the federal share of the work will be continued for two or three years more until complete control of the epidemic has been secured.

Outside of the Klamath-Lake Counties infestations, there are beetle epidemics in progress on several other forests in Oregon which may soon require attention. The ability of the Forest Service to promptly undertake control measures when the conditions on these epidemics justify such work, will result in a saving of both timber and control costs.

Brevicomis control work can ordinarily be efficiently carried on only in October and November and in April and May. Not until the middle of September do the conditions arise which make possible a decision as to whether or not control work should be started within a month and perhaps continued the following spring. It is evident, therefore, that the insect control needs can not be predicted a year in advance. In this respect, insect control is much like fire control. New beetle situations which demand quick action may arise unexpectedly. Old epidemics which by their very severity and large extent are beyond the ordinary financial limitations of insect control work may suddenly partially subside and enable successful control at a much lower cost if prompt action is taken. These are exigencies which may be reasonably expected to arise on the Crater, Deschutes, Fremont, Mt. Hood or Whitman National Forests in Oregon.

It has been estimated that an annual appropriation of $50,000 for beetle control work in Oregon will be ample. It is conceivable that there will be years when the expenditure will be far less than that and that in other years the need will exceed this amount. It is expected that for several years about $25,000 will be required annually for the control operations in the national forests of southern Oregon, primarily the Crater, Deschutes and Fremont National Forests, and an additional $25,000 for the other national forests of the State.

It is roughly estimated that there are about thirty billion board feet of western yellow pine on the national forests of Oregon, worth at least one hundred million dollars. Brevicomis infestations of varying severity are scattered throughout the yellow pine timber of the State. Complete extermination of the western pine beetle is impossible. However, it is possible to keep down the beetle infestations to a point where less than one-half of one per cent of the timber stand is killed annually. Present control methods, by reason of their expense, can not be profitably applied to yellow pine valued at less than $3.00 per M. board feet. Less than one-third of the national forest yellow pine of the State falls below this minimum.

In some quarters, doubt has been expressed as to efficacy and timber-saving character of existing control methods. Present methods are expensive, it is true, but a careful analysis of the results of a well-planned and carefully executed control plan usually shows timber values saved considerably in excess of the cost of control. Large

timber owners like the Long-Bell Lumber Company and the Weyerhaeuser Timber Company have no hesitancy about carrying on control work on a large scale.

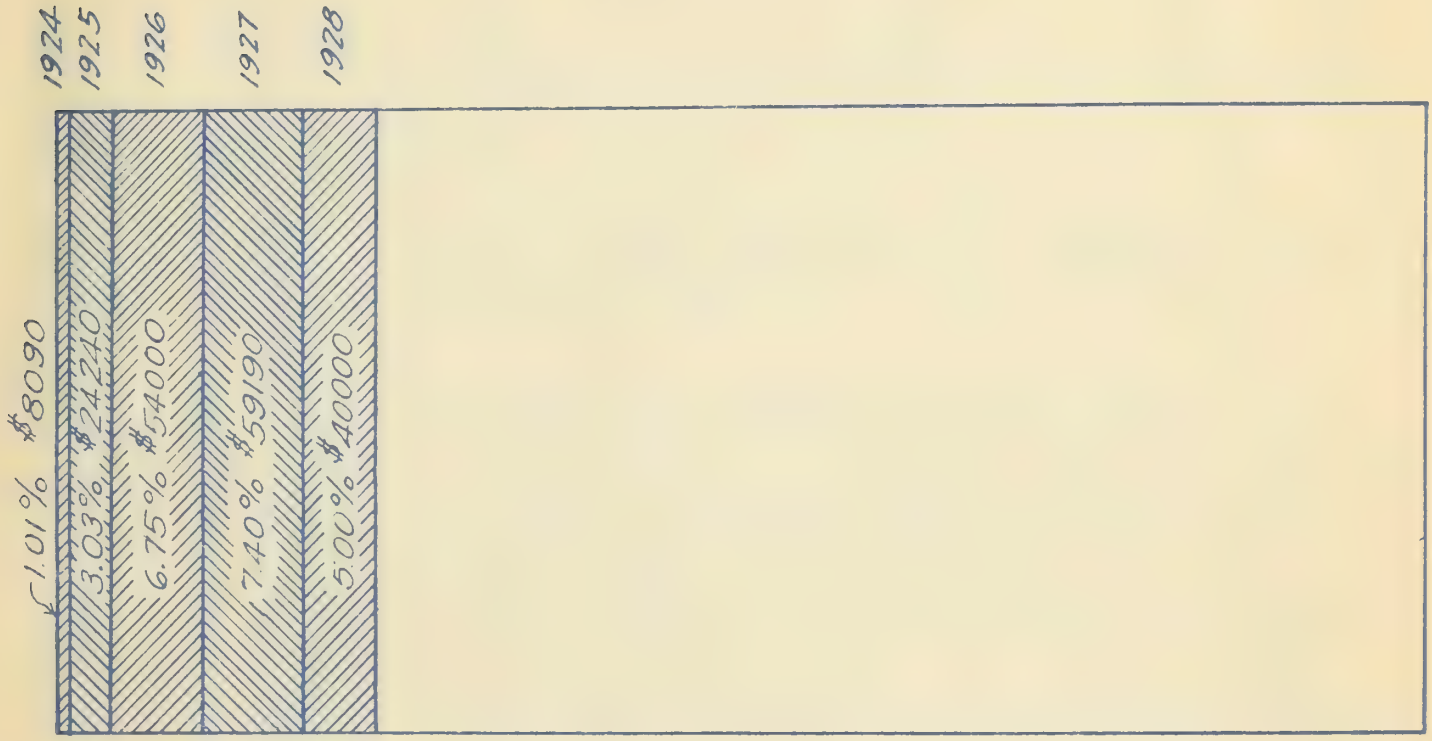
There is an increasing tendency among pine owners in Oregon to regard the prevention of beetle epidemics as the common sense solution of the beetle problem. In other words, they feel that by cutting about 20 infested trees per section per year, they can indefinitely prevent the development of destructive pine beetle epidemics. This so-called prevention work would cost about 10 to 15 cents per acre per year. The owners who are considering such a plan are thinking of applying it primarily to timber which is of high value and which will be logged within ten years or so. A similar plan was tried on the San Joaquin drainage in the Sierra National Forest in California but with rather indifferent success according to the verdict of the Bureau of Entomology. Whether such a plan would be effective in national forest and intermingled private yellow pine in Oregon is, of course, a matter of conjecture. This matter has been brought up because there is some feeling that the Forest Service should secure appropriations for handling the national forest beetle situation in the way which has just been suggested. It seems to the writer that control work in so-called normal or endemic infestations must first be put on an experimental basis before much insect control money is diverted for such work. Theoretically, the prevention of epidemics by constantly whittling away at the low-ebb infestations seems to have merit.

The necessity for the quick availability of funds for beetle control work is well illustrated by a situation which occurred recently in Klamath County in southern Oregon. A block of western yellow pine known as the Horsefly block, containing about 200,000 M. board feet of national forest and private timber was being seriously damaged by the western pine beetle. In 1923 a control program was completed by the Forest Service and the timber owners which reduced the infestation to a low point. In 1924, a fire occurred which covered a considerable part of the area included in the control operations. As a result of the fire and the continued drought, the infestation immediately jumped up again. It was evident that a bad beetle situation was again going to develop and nullify the results of the beetle eradication work unless prompt action was taken.

Insufficient federal money was available to handle the emergency and the timber owners could not carry on effective work unless simultaneous action was taken in the government timber. As a consequence, nothing was done during the five-year period between the close of control work in 1924 and the resumption of work in the spring of 1929. The rapidity with which the infestation grew is indicated by the following figures:-

HORSEFLY UNIT

200,000,000 feet B.M. Value $800,000 in 1923
Showing Insect Damage by Years following Fire



Total loss 23.19% or 46,380,000 feet B.M. valued at $185,520.

This loss of nearly one fourth of the total timber stand could have been largely prevented if funds had been quickly available for control work to meet the emergency conditions created by ~~by~~ the rapid increase in this infestation.

Portland Ore. Oct. 1929. K.E.B.

1924 - 1.01% of stand killed.
1925 - 3.03% " " "
1926 - 6.75% " " "
1927 - 7.40% " " "
1928 - 5.00% " " "

In other words, nearly one-fourth of the timber stand was killed in five years due to the failure to meet the beetle emergency probably caused by the 1924 fire. The national forest and private timber loss amounted to fifty million board feet, worth about $200,000.

In the spring of 1929, the Forest Service and the timber owners finally resumed control work, and at a combined cost of about $14,000 a considerable part of the infestation was greatly reduced.

It is evident that the availability of federal funds in adequate amount in 1925 and in 1926, provided that the timber owners cooperated, would have brought about the saving of considerable pine timber. Logging operations are now in progress in the Horsefly block. The Forest Service has sold a part of the national forest timber at $4.00 per M. board feet and the rest of the national forest timber in the block will probably soon bring an equal price. It is estimated that the five-year loss during the period 1924-1928 inclusive in the national forest timber in this relatively small block, amounted to 15,000 M. board feet worth $60,000, a loss which will be directly reflected in the timber sale receipts during the next five years. The expenditure of $10,000 by the Forest Service and an equal amount by the timber owners in 1925 and 1926 would probably have avoided a large part of the heavy beetle loss.

The Washington Situation

There are only about four billion board feet of western yellow pine in the national forests of Washington and at least half of this volume is scarcely worth three dollars per thousand feet according to present market prices. It is largely on account of the higher level of pine values in Oregon that no control work has been undertaken in Washington. However, beetle surveys of the yellow pine in Washington have been made. Destructive and extensive brevicomis infestations are in progress on the Chelan National Forest. Without doubt, this national forest is the worst beetle-ridden forest in District Six. During the past ten years, at least one-fourth of the yellow pine on the Forest has been killed by brevicomis. Some of the yellow pine

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bodies are so badly depleted that logging operations can not be profitably undertaken. And yet, only a limited amount of control work can be attempted because of the fact that most of the pine timber is only worth from $2.50 to $3.00 per M. board feet. On the Wenatchee National Forest, primarily in the Entiat drainage, there are brevicomis epidemics in progress which need some attention. The location of the Chelan and Wenatchee epidemics is shown on a map which is part of this report.

It is estimated that the annual beetle loss in western yellow pine on the national forests of Washington has averaged 29,000 M. board feet during the past three or four years. If $10,000 were annually available, some of the more pressing beetle situations could be kept under control until such time as logging operations were started in the pine timber under protection.

The general features of the brevicomis problem of Washington are the same as those brought out for Oregon, namely:-

1. Intermingled ownership of pine timber.
2. Need for prompt availability of funds to meet emergencies.
3. Need for money to continue the control operations until results are secured.

Relation of Fire and Insects

Complete protection from fire appears to be an important part of an effective beetle protection program. Two severe brevicomis infestations in western yellow pine have developed in national forest timber in Oregon during the past three years. One of these areas is known as the Fox Butte burn and is located on the Deschutes National Forest. The other burn is known as the Crooked Creek burn and is situated on the Fremont National Forest. Both of these burns occurred in 1926. The Fox Butte burn covered almost 10,000 acres and the Crooked Creek burn involved nearly 9,000 acres. After the fires, both of these areas developed extremely severe and aggressive brevicomis infestations. The infestations are beginning to spread to pine timber outside of the burns and the attacks are showing little evidence of early abatement. For this reason, control measures are being carried on this fall at a total cost to the Forest Service and the timber owners of about $15,000. During the three-year period 1927-1929 inclusive, brevicomis attacks have been responsible for the killing of about 25,000 M. board feet of yellow pine valued at over $75,000 on these two burns.

The severe fires on the Chelan National Forest in Washington during the 1929 fire season were made much more difficult to handle because of the abundance of beetle-killed yellow pine and beetle-killed lodgepole. In fact, some forest officers go so far as to say that the abundance of the beetle-killed timber was as much responsible for the unmanageable character of these fires as the unfavorable winds and low humidity. This increase in fire hazard because of the presence of bug-killed timber is a real problem and is an additional justification for the carrying on of adequate work in western yellow pine.

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Oct. 1, 1929.

Statement of Needs To Protect Federal and Private Timber In Lake and Klamath Counties Oregon Against Beetle Infestations.

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Foreword

Because of the tremendous destruction by pine beetles to privately and federally owned pine timber in southern Oregon during the past few years, the private owners, represented by the Klamath Forest Protective Association, deem it imperative to protect their timber, not only from destruction by fire but from the ravages of forest insects which annually destroy a far greater amount of mature pine stumpage than does fire. To be successful in such beetle control work requires that intermingled federally owned timber be included in any comprehensive protection program.

This situation was called to the attention of the members of the Agricultural Sub-Committee of the House Appropriations Committee during their recent visit to Oregon in August, 1929. At the request of the Committee, this statement and the attached map have been prepared.

The Klamath Forest Protective Association

This Association represents the interests of over 800 private timberland owners in Klamath and Lake Counties, Oregon. The privately owned yellow pine within these two Counties, for the protection of which the Association is largely responsible, is estimated at fifteen billion board feet and conservatively valued at over sixty million dollars.

Closely intermingled with these large bodies of private timber there is an additional stand of fifteen billion board feet of yellow pine, largely within the boundaries of National Forests and the Klamath Indian Reservation. This federally owned pine stumpage has a present market value of at least fifty million dollars.

The Pine Beetle Losses and the Efforts to Control Them

During the past fifteen years the pine beetles have taken a toll of at least two billion board feet of the choicest pine stumpage belonging to these owners - a loss which

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at present stumpage prices is equivalent to about ten million dollars. In the federally owned stands, of Klamath and Lake Counties, the volume of pine killed by the beetles has been equally great although the timber values are somewhat less. These tremendous losses are still in progress, only partially mitigated by the control work which is not as yet on an adequate basis.

Since 1912 an energetic campaign has been waged by this Association against the pine beetle. Not until 1922, however, did the Federal Government cooperate by cleaning up its intermingled federally owned timber. During the three-year period 1922-1924, by the expenditure of $150,000, federal cooperation was put on an adequate basis. Since 1924 the private owners have continued the fight against this timber pest, and the Forest Service has cooperated to the extent of spending about $8,000 annually in the region - a sum which can not be depended upon to meet the beetle emergencies that may be expected to continue to arise in this area. After 1924 the Indian Service spent nothing until 1928 when an appropriation of $25,000 made it possible for the Indian Service to resume beetle control work in southern Oregon on an adequate scale.

Since 1924, and exclusive of 1929, the Klamath Forest Protective Association has spent $50,000 on control operations. To a considerable measure, the expenditures of the Association during this period have been limited by the fact that the federal agencies have not been financially able to participate in the large scale control operations which should have been jointly carried out by the government and the timber owners.

Wherever control work has been undertaken on an adequately financed basis the beetle menace has been greatly reduced. However, the fight against the pine beetle is for the present a more or less continuous affiar just as the protection of forests from fire, since complete extermination is impossible. The most that can be accomplished is the reduction of the beetle losses to a low point and the prevention of recurrent destructive beetle epidemics. With the progress of logging operations in the region during the next twenty years, the mature timber susceptible to beetle damage will be removed more and more rapidly and the need for further beetle protection work greatly reduced.

The Needs of the Situation

The fact that in so many cases federal and private timber are closely intermingled makes it impossible in most cases for either the timber owners or the federal agencies to independently undertake the reduction of the beetle hazard, since the beetles have the ability to spread fairly rapidly from one area to another. Cooperative beetle control is therefore essential.

To provide forest insect protection to the federal lands in Klamath and Lake Counties, and to meet the obligation which the Government owes to its private land neighbors in cleaning up its own infested timber, the Forest Service should annually have available a fund of $25,000, and the Indian Service a continuation of the present $25,000 annual appropriation to meet the insect emergencies as they arise. Outbreaks of forest insects have to be met in much the same manner as do forest fires, and delay in securing the necessary fund for instituting control means a more difficult situation to control and a much larger ultimate expense. These are the minimum amounts which, with the present expensive control methods, should be set aside for this protective work.

In addition, there is one service which the Federal Government is in a position to render to itself and to the private owners, which the private owners are in no position to undertake for themselves - that is the development of improved methods of control which will obviate, or entirely eliminate, the necessity for this tremendous annual expense. During the past twenty years there has been no material improvement in the methods used to control these beetles. These methods are laborious, expensive and not adequately effective.

The Bureau of Entomology, whose function it is to devise methods of combating insect pests, is inadequately manned to do effective work in this important field of forest insect research. The present force for the Oregon and Washington territory consists of two men who are confronted with the solution of all the insect problems not only in the pine region, but in the fir and spruce belt as well. At least two more investigators should be put on these problems in this region. An increase of $10,000 in the Bureau's annual investigative fund would provide for this need. Any improvement in the present control methods which they may devise will return in savings to the Federal Government and private timber owners many times the cost of such investigative work.

Klamath Forest Protective Association

By J. F. Kimball

J.F.Kimball,Secretary-Treasurer.

The Needs of the Situation

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The insect control situation in Oregon and Washington.

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110 10 **|a** United States. **|b** Forest Service. **|b** North Pacific Region.
245 04 **|a** The insect control situation in Oregon and Washington.
260 1_ **|a** Portland, Or., **|c** 1929.
300 __ **|a** 12 l.
500 __ **|a** Issued Oct. 21, 1929.
650 _0 **|a** Insect pests **|z** Oregon.
650 _0 **|a** Insect pests **|z** Washington (State)
700 10 **|a** Jaenicke, Alexander Julius, **|d** 1890-
930 __ **|a** 00000000 **|b** 00000000 **|c** 00000000
946 __ **|a** USDA

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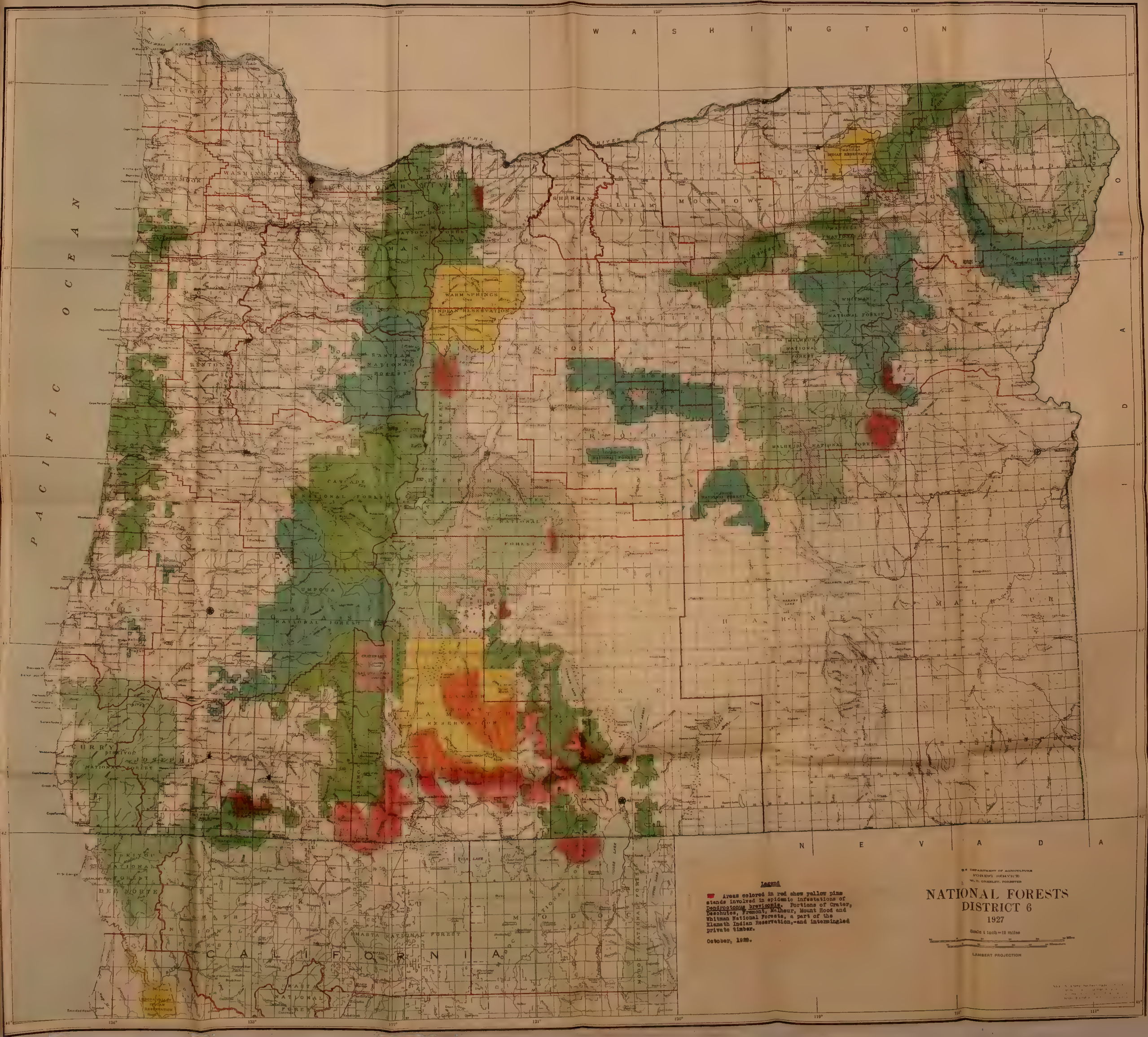

Legend

Areas colored in red show yellow pine stands involved in epidemic infestations of Dendroctonus brevicomis. Portions of Crater, Deschutes, Fremont, Malheur, Mount Hood and Whitman National Forests, a part of the Klamath Indian Reservation, and intermingled private timber.

October, 1928.

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
W. B. GREELEY, FORESTER

NATIONAL FORESTS
DISTRICT 6
1927

Scale 1 inch = 12 miles

LAMBERT PROJECTION


CANADA
VANCOUVER ISLAND
JUAN DE FUCA STRAIT
GEORGIA STRAIT
PACIFIC OCEAN
IDAHO
OREGON
MT. BAKER NATIONAL FOREST
CHELAN NATIONAL FOREST
OKANOGAN NATIONAL FOREST
OLYMPIC NATIONAL FOREST
SNOQUALMIE NATIONAL FOREST
WENATCHEE NATIONAL FOREST
MT. RAINIER NATIONAL PARK
YAKIMA INDIAN RESERVATION
COLVILLE INDIAN RESERVATION
QUINAULT INDIAN RESERVATION
COLUMBIA NATIONAL FOREST
KLICKITAT
WHATCOM
SKAGIT
SNOHOMISH
CHELAN
DOUGLAS
OKANOGAN
FERRY
STEVENS
PEND OREILLE
KITTITAS
YAKIMA
BENTON
FRANKLIN
GARFIELD
COLUMBIA
WALLA WALLA
ADAMS
LINCOLN
GRANT
JEFFERSON
GRAYS HARBOR
PACIFIC
WAHKIAKUM
CLARK
SKAMANIA
LEWIS
THURSTON
PIERCE
KING
KITSAP
MASON
LEWIS
CLALLAM
JEFFERSON
COLUMBIA RIVER
COLUMBIA RIVER
Legend
Areas colored with red pencil represent western yellow pine stands involved in epidemic infestations by Dendroctonus brevicomis. Portions of Chelan and Wenatchee National Forests.
October, 1929.
AREA BURNED FOR ECHO
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Pullma
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
W. B. GREELEY, FORESTER
NATIONAL FORESTS
DISTRICT 6
1927
Scale 1 inch = 12 miles
LAMBERT PROJECTION
Note No attempt has been made to show forest lands in tracts less than 40 acres. Full information on location of national forest lands obtainable from forest supervisors.
Original base from U. S. G. S. State map
Revised at District Office, Portland, March 1926
STATE OF WASHINGTON

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